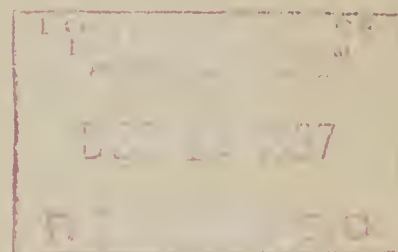
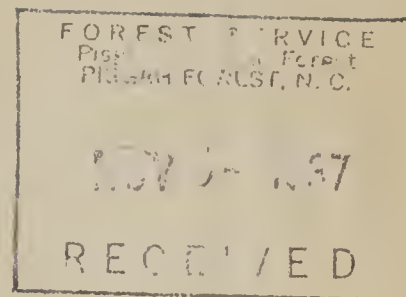
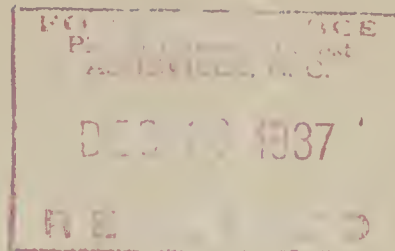


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WILD BOAR STUDY

CHEROKEE NATIONAL FOREST

1937

by

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ASSISTANT BIOLOGIST

AUG 8

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Scope

The following report is the result of a study conducted from June 14 to September 15, 1937. The data herein presented were collected from four sources:

1. Forest Service personnel and records.
2. Personal interviews with natives.
3. German articles relating to the European Wild Boar (which is the same species).
4. Field work carried on throughout the summer.

Purpose

This study was designed to accomplish three things:

1. To secure as much information as possible relative to the history and present status of the wild boar on the Game Management Area.
2. To find out as much as possible about the life history of the animal and its ecological position on the forest.
3. To outline a study to be carried on as long as necessary to complete the information required above and to determine the best management practices.

Acknowledgments

The best possible cooperation was experienced from the entire Forest Service personnel and especially Mr. William P. Duncan and the two game wardens, Mr. Lloyd Matoy and Mr. Irvin Wiess, and their assistants, Mr. Lester Burgess and Mr. John Lovin. Several of the local residents assisted by furnishing information or helping with the hog hunts. Special thanks is due Mr. Ben Ellis, who assisted and furnished dogs on several occasions. Considerable assistance was also given by Mr. Ed Manges in translating German references relating to the European wild boar.

History and Description of the Management Area

The Tellico Fish and Game Management Area of the Cherokee National Forest was designated July 1, 1936. It comprises approximately 100,000 acres and is located in the southern division of the Forest in the southeastern part of Tennessee. The game management area includes all of the Tellico River drainage, including its tributaries, from a point 100 feet below the mouth of Turkey Creek to the Tennessee-North Carolina State Line, all of the Citico Creek Drainage and its tributaries east and south of the Indian boundary and the Salt Springs Divide, and all of the Slick

Rock Creek Drainage within Tennessee. It is a cooperative project between the United States Forest Service and the board of Conservation for Fish and Game and Wildlife in the State of Tennessee.

It is the purpose of the project to protect, propagate, develop, and manage the fish and game resources within the area on the basis of sound wildlife management in the best permanent interests of the public.

With the exception of a few remote scattered places and a relatively small area at the upper ends of the North and Tellico Rivers the entire area has been logged over during the last 30 years. Since reproduction is very good on most of the area, there is an abundant supply of game food. The area ranges in elevation from 1,500 feet to 5,550 feet, much of which is very rugged. National Forest lands and large private holdings block in the game management area very effectively. Highways are scarce adjoining the area and those within the boundary are so arranged that traffic can be controlled very easily. Since it is expected that the private holdings and other Forest Service properties adjoining this unit will soon be included in a similar game management project, the control of poaching should be relatively easy. The area is well removed from large centers of population. The nearest cities of any size are Knoxville and Chattanooga, which are 70 and 72 miles distant, respectively. All of the above facts make the area an ideal place to demonstrate the value of wildlife management. Furthermore, there is a fairly good stocking of desirable game species such as turkey, grouse, bob-white, deer, bear, raccoon and wild boar on the area. For this reason, it should not take the area long to produce results.

History of the Wild Boar on the Forest

The European wild boar was but one of the species introduced by a group of English sportsmen headed by Mr. George Gordon Moore of New York. Mr. Moore promoted the idea of having a large hunting club financed from funds subscribed by English sportsmen. Bonds were sold to these gentlemen and the proceeds used to build a large clubhouse and other buildings near Hooper Bald in North Carolina. A large tract was inclosed by a high fence and various game species were introduced and liberated within the area. The following species were included: bear (mostly cinnamon), elk, buffalo, deer and wild boar. Ten thousand eggs of the English ring neck pheasant were also imported. Due to the rapid expenditure of funds and the failure of these various attempts to stock the area, the venture failed. The wild boar is the only species introduced that has become well established.

The date of the introduction of the wild boar seems well settled. The introduction was made in the spring (April ?) of 1912 and the animals were liberated within a 500-acre inclosure below the clubhouse near Hooper Bald.

Colonel Herford, at Tellico Plains, Tennessee, was the only one to give the source of the introduced stock. He gave it as Northern Germany,

probably the Hartz Mountains. This seems very reasonable since the characters shown by the specimens examined check very well with the characters of the Prussian wild boar.

The number of individuals and the number of species introduced vary in the different accounts from a single adult boar to twenty-five animals of two different species. Without an attempt to prove or disprove any statements made, it seems reasonable to credit the story told by Mr. Cotton McGuire, who was caretaker of the hunting club for years, and which is midway between the extremes. According to Mr. McGuire, about 15 wild hogs were introduced, all of the same species. They were liberated within a 600-acre inclosure and kept there without being disturbed for a period of 8 to 10 years.

About 1920, an attempt was made to hunt them within the inclosure. The animals became excited and broke down or jumped the fence at several places, escaping into the open woods. The number that escaped was estimated at 100. Since their escape, the wild boars have roamed the mountains for a considerable distance. Domestic hogs were running wild in much of this area and cross-breeding occurred freely, as it has in Europe for many decades (Wilhelm Keiszling, "Jäger und Jagd im Dritten Reiche", pg. 33.). They have been hunted freely by the natives, with the use of dogs, from that time until the game management area was established (July 1, 1936). According to some individuals, the wild boars became quite numerous on the forest until some five years ago (1932), at which time there was an epidemic of hog cholera in domestic hogs which wiped out many of the wild boars as well.

At the present time Mr. McGuire believes there are several full-blooded wild boars and sows on the Forest, and many with various degrees of wild blood that possess much the same physical characters. The field observations made during the summer indicate that the present population within the game management area is about 115.

Present Distribution and Numbers

Much more time than that available this summer would be required to make a census of a species as elusive as the wild boar and especially at this time of year. For that reason no attempt was made to determine the exact number of hogs on the area. Notes were taken on the location of fresh hog signs and a rough estimate made as to the number represented by those signs.

Distribution by Locality

At the present time the wild hog population is limited to the head of the north and south fork of Citico Creek and the Tellico River, North River and Bald River drainages. This area was covered in the field investigations. As a result, the total number on the game management area is estimated to be about 115 and this number distributed over the area about as follows:

Bald River

Paw Paw Cove	10	
Big Basin	10	
Henderson Creek	10	
Kirkland Creek	15	
Brookshire and head of river	<u>20</u>	65

Tellico River

Panther Branch	10	
Green Cove	10	
Turkey Creek	5	
Other branches	<u>5</u>	30

North River

Entire drainage	10	10
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Citico Creek

Entire drainage	10	<u>10</u>
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GRAND TOTAL 115

Since much of the adjacent area of North Carolina is populated with wild hogs, there is a continuous drift in both directions across the State line. The population seems to be more scattered in that area, but the total number would probably about equal that on the game management area. These figures would make a total of about 230 wild hogs in the entire region.

The above estimate is considerably lower than the number previously thought to be on the area. As the field study was continued during the summer, it was found that a group of hogs drifted from one area to another very rapidly. A single group of hogs is thus responsible for extensive and widely separated field signs which were previously attributed to different groups of animals.

Distribution by Habitat and Feeding Areas

There is a definite correlation between the type of habitat and the distribution. During the first few weeks of this study, the hog population was largely limited to the heads of the higher heavily shaded and moist coves. As the season advanced, the hogs drifted into the blackberry thickets lower down in the coves. In these areas they became quite concentrated. When the blackberry crop began to wane, the hogs took more to the higher slopes where huckleberries were plentiful. They seemed to follow up the slopes as the berries ripened. This period was followed by a concentration in areas where apples were plentiful.

This relation between food supply and distribution no doubt continues throughout the year and for this reason the distribution throughout the game management area will change with the season.

Distribution by Age or Size Classes

Field observations show three groups to be accounted for in distribution:

- First Sows and very young pigs. The sows bear their litters in a solitary place and keep them separate from the larger animals until they are well able to travel. They use the same type of habitat, but remain in a single area much longer.
- Second Larger pigs, shoats and sows. This group includes all ages from one or two months to the older sows. They travel together in bands, evidently for mutual protection.
- Third The third group consists of the older boars which are usually solitary individuals. These animals travel great distances. They frequently feed with the larger bands or groups during the night and then spend the day alone. They are more apt to be found along the higher ridges during the daytime.

Other Distribution Factors

There are other factors involved in determining the distribution. For example, the presence or absence of other species, such as bear or man, which annoy or prey upon the hogs. During the field study, wherever bear signs were plentiful and fresh, we found no fresh signs of hogs, even though hogs had previously been quite numerous. When an area was much frequented or disturbed by man, the hogs left. Areas in which we hunted were deserted by the hogs for a period of from one to several days. The presence or absence of wallowing areas is evidently a factor. The amount, kind and distribution of cover are other factors. This does not exhaust the list, but indicates the more important ones.

Physical Characters

The European wild boar which was introduced into this area is a large powerful animal reaching a height of over three feet at the shoulder and a weight of 400 pounds. Some German writers give a much greater maximum weight, e.g. Eberhard von Riesenthal "Die Guete Deutsch Weydewerk Allowege", pg. 16, says, "Weights up to 300 kilograms and usually 150 to 200 kilograms before dressing". This would mean weights up to 661 pounds and usually 331 to 440 pounds before dressing.

Their body is built somewhat like that of a buffalo, being higher and heavier in the shoulder region. The high and erect mane on the neck

and along the spine over the shoulders accentuates this difference, making the shoulders appear much higher than the hips. The hips are lighter and more angular than in the domestic swine. The head is long, ending in a slender mobile snout. The ears are small, more pointed and very heavily haired. The tail is long and mule-like, with a large tuft of long hair at the tip. The canine teeth are well developed in both sexes and in the males become large, upwardly directed tusks. The front feet are somewhat larger than the hind feet. The skin is thick, as in the domestic hog, and in the males becomes greatly thickened over the shoulders, forming what is known as a shield. The pelage consists of coarse bristles similar to the domestic hog, but much heavier and developing a pronounced mane of long heavy bristles from the top of the head along the spine to the top of the hips. In the winter coat the bristles are much longer, reaching a length of five inches in the mane, and are supplemented by a dense undercoat of fine curly wool-like hair.

To quote Wilhelm Keiszling "Jager und Jagd im Dritten Reiche", page 33, "The normal color is light to dark grey, although there are regions in which the vigorous wild boar are coal black in the winter coat becoming silver grey on the head. Color varieties of brown and piebald (black and white) hogs have been observed." This description seems to fit the specimens examined from this Forest. The prevailing color of the adult is a grizzled dark grey. Natives report two colors represented on the Forest; one as mentioned, and the other a sandy or rusty brown.

The present stock on the Forest varies in physical characters from the above description to the various breeds of domestic stock that have run wild here.

Measurements given for the European wild boar in Germany by Eberhard von Riesenthal l. c. are as follows:

Total length	175	cm.	or	68.9	inches
Tail	47	cm.	or	18.5	"
Ear	15	cm.	or	5.9	"
Head	42	cm.	or	16.5	"
Shoulder	92	cm.	or	36.2	"
Hip	84	cm.	or	33.1	"
Weight	150-200	Kgm.	or	330 to 440	pounds.

No averages can be given for specimens taken from this Forest, as no record was made of the size of the animals taken by the natives. The animals for which records are available represent different ages and sexes and are of unknown breeding. The largest hog killed during the hog hunt was estimated to be full-blooded "Russian" and thought to weigh 175 pounds. The total length was recorded as 47 inches and the tail length given as 11 inches.

During this study a young boar (estimated age 2 years) was taken, with an estimated weight of 225 pounds and the following measurements:

Total length	62 inches
Tail length	$12\frac{1}{2}$ inches
Foot length	$10\text{-}\frac{3}{4}$ inches
Ear length	$6\frac{1}{2}$ inches
Head length	$12\frac{1}{2}$ inches
Shoulder height	27 inches
Hip height	22 inches

It was estimated that this animal was about $\frac{3}{4}$ wild stock, and it will be seen that the measurements check very well with those given for the full-blooded European boar. It was a very vigorous animal and would have grown much larger. The tusks were exceptionally well developed for its age, and the hide was greatly thickened over the shoulders, forming a shield which is characteristic for the wild species.

Field Characteristics

A list of characteristics have been worked out to assist in distinguishing the wild boar from the domestic hogs and to distinguish the tracks of hogs from those of the deer.

1. Hog tracks can be distinguished from deer tracks because the hoof is rounder and the dew claws are imprinted wherever the dirt is soft. In very soft places the dew claws of deer may be imprinted; however, in deer they are directly behind the toes, while those of hogs are placed more lateral to the toes, and the dew claws of hogs are pointed, not rounded as in deer.
2. Wild hogs have a narrower hoof than the domestic; their legs are longer and their tracks farther apart.
3. The trail of the wild hog is more narrow than that of the domestic, the tracks being made almost in a single line. The tracks of the domestic are offset, forming two lines or a single zigzag line.
4. The wild hog will run or jump up banks too steep and high for the domestic to climb.
5. The wild hog is a good jumper and will leap over obstacles such as down logs where the domestic would go around or under.
6. Wild boar frequently cross streams by walking down logs, while domestics would go through the stream.

7. Wild hogs are much taller than domestic hogs. Therefore, the height to which trees are mudded may be good evidence that the animals are wild.
8. There is a difference in feeding sign, as explained under feeding habits.

Physical characteristics of the hogs themselves that are differential may be listed as follows:

1. The front feet are larger than the hind feet.
2. The ears are short, erect, and very well haired in wild hogs.
3. The shoulders are higher and much heavier than the hips.
4. The head is long and very pointed.
5. The tail is long and mule-like, with a big tuft of long hair at the tip.
6. Wild hogs have a well-developed mane from the top of the head to the point of the hip.
7. The hips are angular and relatively light.
8. In the winter coat the bristles are supplemented by an undercoat of fine curly wool-like hair.
9. In the males the tusks are exceptionally well developed.
10. The young pigs are striped longitudinally.
11. In large boars the skin is greatly thickened over the shoulders to form a heavy shield.
12. The body is narrower and carried higher from the ground than in the domestic hog.
13. The legs are longer and stronger.
14. The snout is longer and more mobile than in the domestics.

Habits

The wild boar has many habits that are similar to those of the domestic hog. They are more alert and more wild than even the wild domestics, which makes it very difficult to observe them. Their senses of smell and hearing are very highly developed and they rely much more on these senses than on sight. Their habits are determined

in part by their environment and the conditions imposed upon them in that environment. Until July 1, 1936, the wild hog on this area had been hunted relentlessly by the natives, who used dogs freely. As a result, the species is now one of the wildest on the forest and the most difficult to observe. It occupies the remote and inaccessible places and under the present conditions is primarily nocturnal.

Daily Habits

Daily habits change with the local conditions and with the season of the year. At the present time, after years of hunting, the wild hog does most of its feeding and traveling under the cover of darkness and spends the day in wallows or in beds on the side of ridges. According to Mr. Wilhelm Kieszling, "Jager und Jagd im Dritten Reiche", page 34, "The purely nocturnal and wandering life is not in the least characteristic for the hog. They very soon give up those habits if one gives them peace, or if they are well fed." If that observation is correct, the wild hog should become more diurnal on this area under the protection now afforded it. The field observations indicate that when feeding in areas which furnish abundant cover, such as blackberry thickets, hogs remain active throughout the day. When in more open areas, such as the huckleberry patches along the sides of ridges, they seek other cover during the daytime. As food and cover changes with the season there will be a corresponding change in daily activity.

Seasonal Habits

Environmental conditions change with the season and the wild boar must adjust itself to these in order to survive. There is a continuous change in the climatic conditions, kinds of food available, location of the food supply, conditions of shelter and cover, the presence and behavior of other species in the area, and still other factors. Further field study is necessary to determine many of the seasonal habits.

A few general observations can be made at this time, based primarily upon the reports of the game wardens and the natives.

1. The wild hog is active throughout the year and is well adapted to cold weather.
2. Dens are not used even during the wintertime.
3. Winter beds are more elaborate and usually located in dense thickets of laurel in some relatively rough and remote area.
4. The wild hog feeds chiefly along mast-producing ridges during the winter season and shifts its feeding area with the changing supply of food throughout the year.

5. No distinct breeding season is known for the species on this Forest, a condition that is in variance with that of the same species in Germany (see breeding habits).
6. Hogs have a much larger daily and yearly cruising radius than any other species in the Forest.

Feeding Habits

In general, the feeding habits of the wild hog are similar to those of the domestic hog. They are both omnivorous, feeding upon practically all kinds of plant and animal matter. The hogs often band together and do most of their feeding at night under cover of darkness. However, there is a difference in their manner while feeding. Natives who have observed the wild hog have emphasized the nervous and alert, yet quiet manner exhibited as it fed.

Since the wild hog ranges more extensively than the domestic, there is a decided difference in the feeding sign or trail left by the two types of animals. The trail of the wild hog is scattered and extends over a large area. When an individual feeds alone it frequently roots in a straight line, takes a few steps and repeats the operation, thus producing a fairly straight scattered trail. It is not unusual to trail a wild hog for several miles by such sign, the entire trail having been made during a single night. In contrast to this, the domestic hog makes longer stops, roots deeper, and works over much wider strips. Their feeding sign is therefore much more localized.

Other conditions being equal, the wild hog feeds upon whatever food is most plentiful and easily secured. This results in a drift from one area to another, as already mentioned.

In June, feeding signs were plentiful in the upper parts of the higher coves. Beds of succulent herbs were rooted up, and evidently the herbs, roots, and lesser animal life found in the soil were eaten. The heads of streams were rooted up, and probably crayfish and salamanders (spring-lizards) contributed to the diet.

During the blackberry season, hogs concentrated in the coves where these berries were plentiful. Many briars were trampled, and in some places part of the plants were torn up by rooting. Regular trails were worn under and through the thickets. During this season, feeding continued through the heat of the day, especially along the streams in berry-covered coves.

The huckleberry season followed the blackberry season and the hog population shifted its feeding areas up the slopes with the ripening crop. Huckleberries grow on open slopes where cover is poor, the temperature high, and water scarce. At this time most of the feeding was done under the cover of darkness.

About the time the huckleberries were ripe on the upper slopes, the apples were ripening in the old fields in the coves. These then

became principal feeding centers. In many cases the ground around the trees was trampled bare. Little rooting was in evidence near the trees, since the ground was generally hard and relatively dry. Parts of apples and even chewed bits were left scattered beneath the trees where the supply was abundant.

Several old hunters have told of finding large holes, two or three feet deep and four or five feet across, rooted out by wild hogs along the ridges. These were always found late in the fall. Such holes were probably made by the hog in rooting out hoarded nuts and other mast that had been stored by ground squirrels.

Further observations should be made throughout the year to determine their habits relative to the different foods.

Wallowing

Wallows furnish considerable information, since they are used by the hogs repeatedly. The age of the sign is quite easily told, the tracks surrounding a wallow show the sizes represented in the group using it, and the condition of the wallow or group of wallows gives an idea of the number of hogs in the group. If a wallow has been used a considerable amount, the surrounding vegetation will usually be heavily trampled and smeared with mud. Wallows were found chiefly near the upper ends of the higher coves, in shaded, cool and wet places. Some were quite extensive and evidently were used by several hogs at a time, while others were just large enough for one hog. These frequently gave a very good idea of the size and shape of the user.

The wallowing habit is continued throughout the year, according to the accounts of local hunters. They report many instances where hogs have broken the ice to wallow and state that, when pursued during the winter, they frequently wallow in each stream they cross.

Rubbing

Rubbing is a habit closely associated with wallowing. The wild boar usually chooses a pitch pine less than six inches in diameter for a rubbing tree. Rubbing was noticed on several other species, but such examples were so rare that the preference for pine was clearly shown. Such trees are usually mudded from near the ground (4 to 8 inches) to a height about equaling the height of the animal making the sign. On many occasions this mudded and rubbed condition reached a height of 36 inches and in the area near Paw Paw Cove it reached a height of 37 inches. The height of the sign only indicates the approximate height of the tallest hog using the tree. The freshness of the sign indicates its latest use and the color of the mud is indicative of where the user or users wallow. Many bristles are found on and around the trees, which indicate the color of the hogs using them. All of these bits of information are useful in determining such things as home range, daily habits, wandering tendencies, etc.

In Germany, such rubbing trees are called boundary trees and are useful to the hunter in determining the presence of the wild boar in the area.

The rubbing trees are located along trails and near wallowing places. Several were seen along ridges at a considerable distance from wallows. Not infrequently other trees and vegetation along hog trails are found mudded. The extent of such sign is an indication of the number of hogs and the amount of use along the trail. Such sign indicates the height of the larger animals and may also indicate the time of day the trail is used.

Tusking Habits

The wild boar does more tusking than the domestic boar. Tusking sign is very common on the hog-inhabited areas. The trees tusked are usually rubbed as well. Tusk injuries have been found only on pine trees and considerable pitch is rubbed from these trees by the wild hog. The pitch may have something to do with the selection of this species. Many wounds are usually present on the same tree.

On several occasions when the tusk wounds were fresh, tracks could be seen at 12 to 24 inches from the base of the trees where the hoofs were thrown into the ground sideways as though the animals had been playing.

Bedding

Several bedding places were observed. With the exception of one, which was located in a rhododendron thicket in Henderson cove, all were located on the side or near the top of a ridge. Most of the beds were located in thickets of some kind and always under good cover. In practically every case the dirt had been loosened over the entire bed. No additional materials had been added. Apparently, the hog prefers to lie on the bare loosened dirt.

It is to be expected that more elaborate beds will be made during the colder season. Some natives report hogs cutting considerable brush and throwing it into a pile under which they bed. Others deny this habit in the wild species, saying it is only done by the domestic species. Further field observations are necessary to determine such points.

Breeding Habits

Large wild boars range over a very large area and are known to visit practically all the tame sows present. They drive off or kill tame boars and breed freely with the domestic sows. Judging from the heavily scarred condition of the hides examined and from reports of the natives of badly cut up tame boars, it seems evident that the strongest, most able boars sire the most pigs.

No distinct breeding season is known for the species on this Forest. According to reports from natives, tracks of very young pigs

are seen at all seasons of the year. Young pigs too small to leave the bed, which would mean less than one week old, have been seen in December. During the summer's observations, tracks representing ages from two months up were in evidence; however, tracks of real young pigs from one week to one month old were first seen in August and were even more plentiful in September. The observations of the natives would indicate no regular breeding season, and the observations made during the summer would indicate two breeding seasons. Both conditions would be at variance with conditions reported for the same species in Germany. Mr. Wilhelm Kieszling "Jäger und Jagd im Dritten Reiche", page 34, says that the normal breeding season falls in December. Mr. Eberhard von Riesenthal "Naturdenkmaler unter den Jagdtieren Deutschlands", page 174, says that the rutting period is rather irregular and takes place from the end of November until the middle of January.

The number of litters per year is also unknown. A small amount of information was secured from three sows killed during the summer. They were not full-blooded wild individuals however, and probably differ from the full-blooded stock. Two of the sows had suckling pigs, one litter being about one month old and the other two months old. When the ovaries were examined, several fairly mature follicles were found in each, which would indicate that ovulation would probably occur within a month or so. The third sow was pregnant, having four fetuses about $2\frac{1}{2}$ months along. The ovaries, still distended with the discharged follicles, had several well developed ovules. This also indicates a short period between the birth of the young and the next ovulation. From these observations more than one litter per year would be indicated. The sows were evidently hybrids, and as such might be expected to be more prolific than the full-blooded animals.

The gestation period is unknown for this area. However, in Germany it is given as 18 to 20 weeks (Mr. Eberhard von Riesenthal, l. c. page. 174). The gestation period for the domestic hog is about 110 days, which is, therefore, nearly one month shorter than that given for the wild hog. Information of this kind can be secured from the hogs being kept in captivity.

The period devoted to this study was not sufficient to determine a definite answer to the question of breeding habits. The following is strongly indicated:

1. The hybrid animals on the Forest produce two litters per year, one being born about April or May, and the second in August or September. No doubt considerable irregularity exists in these seasons; consequently, a litter may be produced at any season.
2. Judging from the absence of very small tracks from June to August, and the increased number of such during the first part of September, there are two breeding seasons represented.

3. In all probability the wild stock will have but one litter per year as in Germany (see references above).

Birth of Young

Very little is known about the habits of the wild sows at the time the young are born. Litters of very young pigs have been found in beds located on the side of ridges. Signs observed during this study indicate that the sows leave the other hogs at this time. Evidently, the young are born in a quiet secluded spot and are cared for by the sow apart from the other hogs until they are able to travel with the group. In this respect, Mr. Eberhard von Riesenthal, l. c., says that the sows bear their young in a soft, well concealed bed, and the young do not leave the bed for the first days. After that, they follow their mother everywhere.

Growth and Development

When born, the pigs of the wild boar are striped longitudinally with light rust or sandy-colored stripes on a dark brown ground color. The striping gradually disappears at an age of about six months. The heads are long and the snouts very pointed from the time of birth. By the time the pigs reach an age of one or two months, they have a very pronounced mane along the spine from the top of the head to the point of the hips. The tail gradually becomes longer than in the domestic and is pronouncedly so at the age of one year. Local people who have raised young wild boars that were caught on the Forest and who have raised litters from their domestic sows that were sired by wild boars, report a more rapid increase in stature for such pigs than for the full-blooded domestic pigs. The weight increase is reported to be less rapid than in the domestic stock, after the first few weeks. This can be attributed to the much more rangy characters of the wild stock. They declare it is impossible to fatten the wild stock as they can the domestic animals.

Some interesting information relative to the growth and development of the European wild hog in Germany (which is the same species) is given by Mr. Eberhard von Riesenthal (Naturdenk maler unter den Jagdtieren Deutschlands", page 173, as follows:

The weights are given for the different ages.

Pigs up to one year of age,	15 to 38 kilograms	or 33 to 84 lbs.
Shoats " " " " "	22 to 72 "	or 48 to 158 lbs.

He also says that the dentition offers a check on the approximate age of the pigs; the newly born pig has only eight milk teeth, therefore, not the full dentition. The milk dentition is first complete in three to four months. At that time the first teeth of the permanent dentition come in. At the age of from ten to eleven months the permanent dentition comes, and at the end of two years the wild hog had the entire permanent dentition. If an individual still has the milk canines, it is at

most eleven months old. After a year the permanent tusks, with their three-cornered cross-section, are beginning to grow. The wild boar reaches sexual maturity at an age of $1\frac{1}{2}$ years.

The last observation indicates that the wild species requires a much greater time to reach sexual maturity than does the domestic hog.

The hogs being kept in captivity will serve to answer many of the questions relative to growth and development.

Parasites and Disease

To determine conditions relative to parasites and disease, it is necessary to make a continuous study during all seasons of the year. Many specimens have to be closely examined and the condition of the species on the Forest observed for a considerable period of time.

At the present time there is little information available. During the last public hog hunt, Mr. Greame A. Canning of the University of Tennessee, examined what specimens he could for internal parasites. It is understood that he found none. During this summer, five hogs were killed and examined with the following results:

1. External parasites were present on every animal. Ticks were present on all of them, and hog lice on four of the five.
2. One round worm (ascaridae) was taken from one specimen.
3. All animals seemed free from disease.

Four more animals were taken alive and each was infested with ticks. Hog lice were not found on any of these specimens.

All specimens killed should be made to yield as much information of this kind as possible. During public hunts a technically trained man with a sufficient number of assistants to secure the external parasites, viscera, and other diseased or abnormal parts should be provided to secure this important information.

Relations to Other Animals

The wild boar is related most obviously to other species of animals through its omnivorous feeding habits. Since it eats practically anything that any other animal will eat, it becomes either a competitor for certain foods with them, or one that feeds upon them.

As far as is known, all of the lesser animals such as the invertebrates and even the lesser vertebrates, contribute to the hog's diet. Worms, insects, and other invertebrate animals are eaten whenever the opportunity offers, whether they are in, on or above the ground. Crayfish, frogs, salamanders, lizards and snakes are all eaten as food.

Even smaller animals such as ground squirrels, young birds, bird eggs, and the like are eaten on occasion.

The relation of the hog to the larger game and predatory animals is of direct importance to the game manager. Some of these relations may be listed by group or species.

Birds

Bob-White (quail)

The hog may destroy an occasional clutch of eggs and possibly catch an occasional young bird of this species. The total amount of damage is probably very small, as the number of such incidents is bound to be small.

Ruffed Grouse

It has been said by local residents that hogs destroy grouse nests and young. No doubt that happens occasionally. On the whole, the activities of the hog on this area appear to be more beneficial than harmful to grouse, because of the manner in which they turn up the ground, exposing insects, small root tubers and similar grouse food. Grouse are plentiful in the area around Hooper Bald and Haw Knob, where the wild hog has been present for the greatest length of time. This fact speaks for itself.

Turkey

At the present time turkeys are most numerous in areas inhabited by wild hogs. This proves that the two species are not incompatible, in spite of such reports from native hunters. Judging from observations made in the field, the feeding habits of the wild boar are definitely favorable to turkey. Turkeys frequently work over areas torn up by the wild hog to secure the root tubers, insects and other food exposed. It is also true that the wild boar consumes large quantities of mast, which is valuable food for turkeys. This competition might be very serious if hogs took all of the food from the patches in which they root and wallow. Many tuberous roots, insects and other valuable turkey foods are left by the hogs for the keener-eyed bird population.

Generally speaking, it appears that the hog competes with the gallinaceous game birds for certain foods such as berries and mast in season, but due to its loose feeding habits, it is a benefactor when other foods become scarce. No doubt some young birds, eggs, and nests are destroyed by hogs. The fact that the above birds are most plentiful in the hog populated areas is good evidence that their relations are satisfactory.

Mammals

Squirrels

All species of squirrel will be considered together. Ground squirrels probably suffer the most from hogs, since their winter stores and homes are frequently destroyed and the animals themselves occasionally eaten. The red, grey, and fox squirrels do not suffer much, as their arboreal habits protect them very well.

Skunks

Since both the little spotted and the big striped skunk have a diet that is chiefly insectivorous, there should be no serious feeding conflicts, and no evidence was secured to indicate any other unfavorable relations.

Opossum

The opossum is an omnivorous feeder, although more carnivorous than the hog. Food competition no doubt exists between these species. Few signs of the opossum were seen, probably because of the predators. The hog is probably not an important factor in the life of the opossum.

Raccoon

The raccoon is another omnivorous animal with fairly aquatic feeding habits. Without doubt, the competition between the hog and the raccoon is quite severe in some of the upper coves. Crayfish, frogs, salamanders, etc., are evidently prized by both species, and the hog dominates the situation. There is still plenty of such food in the streams examined, however, and the present scarcity of raccoon is probably due to hunting and not to hogs.

Foxes

Neither the red nor grey fox is affected to any extent by the hog. Both species might catch a very young pig on occasion. These species probably influence each other very little.

Bobcat

The bobcat is exclusively a predator and in that role takes toll of the young pigs. The bobcat is probably one of the hog's worst enemies. Damage is probably limited to the young pigs and shoats, however, since they would hardly be capable of killing a full-grown animal. If the bobcat became numerous, it might well become the limiting factor to the hog population.

Bear

The black bear is omnivorous and feeds upon much the same foods as the wild hog. Its feeding habits are different, as it depends upon

its claws and teeth to secure its food while the hog uses its nose as a plow. The bear preys upon the hog, killing both large and small animals. The two species do not occupy the same area at the same time, and this fact may bring out a real problem in managing the area for both species. At the present time there seems to be food enough for both species. The bear hibernates during the winter, thus eliminating the food competition at the time of year when food is least plentiful.

Deer

Deer are herbivorous animals and browse during most of the year, therefore, they would compete only with the hog for the mast crop during the fall and winter. At the present time there is plenty of food in the form of browse for the deer, and there is a heavy mast crop. Neither animal should suffer from this common use of such food for awhile. A study should be made of this food relationship during the winter. The same areas are inhabited by both species at the present and are probably compatible.

Outline for Further Study

The study of the wild bear should be continued along three lines: First, field observations; second, hog hunts; third, captive animals. The details for each phase will have to be worked out by the man in charge of the wildlife work on the Forest. Much of the information may be secured incidental to other wildlife work. Some general suggestions are the following:

Field Observations

The making of field observations is highly important and should be carried on throughout the year. Much of this work can be done by game wardens and their assistants. Any other personnel assigned to wildlife field work should be required to contribute what they can. Field notebooks should be provided for this purpose and supplied with blanks that call for the needed information. The preparation of these blanks should be attended to by the wildlife specialist on the area to assure the collection of the facts most pertinent to the wildlife management problems on the Forest, including species other than the wild boar.

To assist in the preparation of such blanks, a list of questions that should be answered, at least in part, by the field observations follows:

1. What is the distribution of the species on the Forest?
2. How does the distribution change with the season?
3. What is the population and how is it distributed according to age classes and sexes?

4. What is the effect of public hunting on the distribution?
5. What is the cruising radius for the species for the day, season and year?
6. What are its feeding habits, breeding habits, bedding habits, etc.?
7. When are tracks of little pigs first seen and where?
8. What are the principal foods at different seasons of the year?
9. Is there any unfavorable food competition between the wild hog and other game species?
10. What are the principal enemies of the wild bear?
11. What is the critical time of year for the species?
12. What is the critical period in the life history of the wild bear?
13. What are the limiting factors to the increase in hog population?
14. Does the hog have any special requirements such as wallowing areas, rubbing trees, etc.?
15. What is the behavior of the wild hog during different activities such as feeding, bedding, rubbing, fighting, running, jumping, etc.?

Hog Hunts

Whenever a hog is killed on the Forest by private or public hunting, as much information as possible should be recorded from it. To facilitate this matter, the wildlife technician should prepare blanks with the proper headings. Some of the questions to be kept in mind are the following:

1. What is the percent of wild blood in the specimen?
2. What are its physical characters, including the following: Total length, tail length, ear length, foot length, height at the shoulder, height at the hip, color, weight, age and sex?
3. Where, when, and how was the animal killed?
4. Is it infested with external or internal parasites? What kinds of parasites are they, where located, and how many?

5. Is there any abnormality in evidence, such as warts, tumors, etc.?
6. Is there any evidence of disease and, if so, what?
7. What are the most successful hunting methods?
8. How can hog hunts be best administered?

Captive Animals

The captive animals should be so handled that all possible information is secured from them. Some of the questions they should answer or help to answer are the following:

1. What is the purity of the present stock?
2. How can a full-blooded stock be produced?
3. How long does it take to purify a stock?
4. Are the wild characters completely dominant?
5. What are the results of known cross-breeding and inbreeding?
6. At what age do the hogs become sexually mature?
7. Is there anything peculiar about the breeding habits or birthing requirements?
8. What is the gestation period of the wild hog?
9. What is the sex ratio at birth?
10. How many young per litter for young sows and older ones?
11. How many litters per year?
12. Is there a distinct breeding season?
13. How old are the young when they leave the bed?
14. What is the weight and description of the young at birth?
15. What is the rate of growth and development?
16. Are the wild hogs subject to the diseases of the domestic hogs?
17. Do wild hogs have special food requirements?

18. What are the changes in coat color and how correlated with age?
19. What is the difference between the summer and winter coat?
20. What is the best technique for raising wild hogs?
21. What is the best age at which to liberate pigs?
22. What is the cost of raising pigs to the best liberation age?
23. Would it be advisable to raise pigs to help replace the number killed and lost on the Forest each year?

From the above list of questions it is evident that very careful observations and records should be made at all times. Such records should include the costs and labor involved. Some of the questions will require the continuation of the study for a considerable time.

Conclusions

The wild hog on the Forest is the European wild boar *Sus scrofa* L.

There are a good many animals that appear to be full-blooded wild-stock on the Forest.

Many of the hybrids (wild x domestic) possess many of the physical characters of the wild boar.

So far as known, the characteristics of the wild boar are dominant over the domestic characters.

The hybrids appear to be fertile when crossed in all ways.

Wild hogs are the most gamey species on the Forest.

A hog hunt would be advisable this year, since it will tend to eliminate the more domestic animals on the Forest, thus purifying the stock.

The area is well suited for the species.

At the present time there is no severe conflict between the wild boar and the other game species.

